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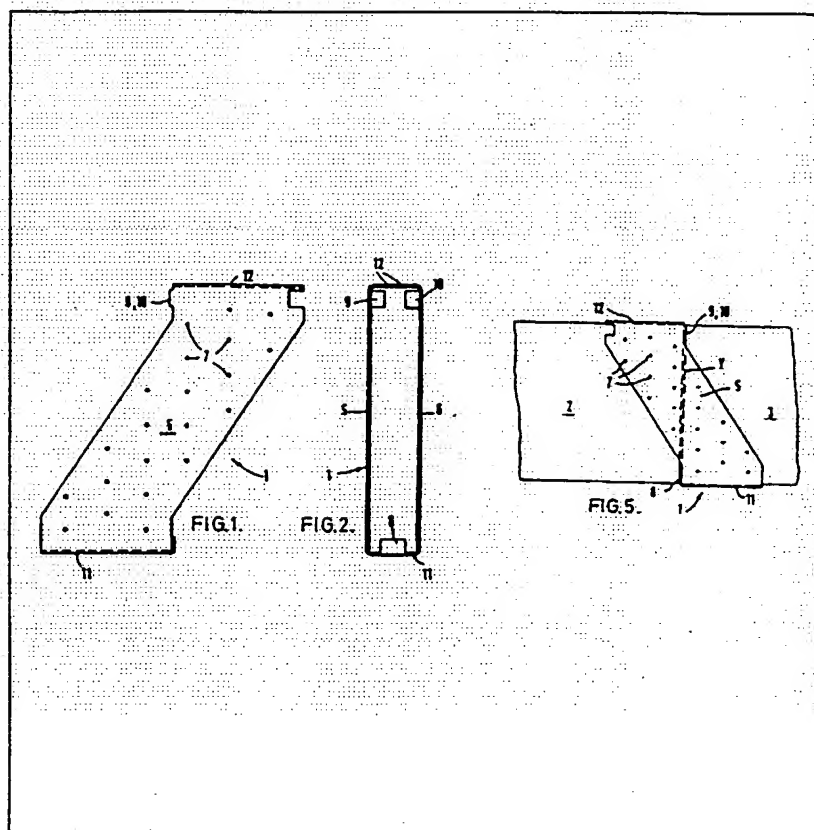
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(54) A purlin or joist connector

(57) The invention relates to a purlin or a joist connector 1, for connecting adjacent ends of two purlins or joists, formed from a single blank of metal and comprising two metal plates 5 and 6, means in the form of holes 7 for nails or screws and stops 8, 9 and 10 to limit the respective positions of the ends of the purlins or joists 2 and 3.



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## SPECIFICATION

## A purlin or joist connector

- 5 The invention relates to a purlin or joist connector. Purlins or joists are often made of wood and in use extend from an outer boundary wall of a building into the interior of the building, often for supporting floorboards. There are usually two purlins or joists extending towards each other from opposite boundary walls at any particular location in the building, the free ends of the meeting purlins or joists being supported in a joist hanger. Such a joist hanger usually comprises a "Z"-shaped piece of metal, the lower limb of which supports one joist, the other being received below the upper limb of the "Z", the other joist being supported by securing means such as nails driven through holes which are formed in side straps which extend between the upper and lower limbs. In order to secure the straps, their free ends are bent to overlie the upper limb and to underlie the lower limb, the bent over ends being secured as by being welded to the respective limbs. These bent over ends provide an uneven mounting for floor boards subsequently laid in position and also ensure that the whole joist hanger is expensive and complicated to manufacture. It is an object of the invention to seek to mitigate this disadvantage of the prior art.
- According to the invention there is provided a connector for connecting adjacent ends of two purlins or joists extending in substantially the same plane, comprising a plate adapted to extend between respective adjacent outer surfaces of both purlins or joists and including means for securing the plate to those outer surfaces and means to limit the respective positions of the purlins or joists.
- The connector may comprise two plates connected by a web to provide a substantially U-shaped sleeve, and each plate and the web may comprise respective means to limit the position of adjacent ends of aligned purlins or joists. This construction provides for automatic alignment of the connector in the correct position relative to the end of a joist.
- The plates may be formed from a single blank of metal which when folded provides a first plate, a web or seat, a second plate substantially parallel to the first plate, the web or seat connecting the two plates, and aligned means of each plate and of the web or seat to limit the position of adjacent ends of two purlins or joists connected by the connector in use thereof.
- The means to limit the position may be a stop provided at one extremity of the plate or plates.
- The stop may be integral with the plate and turned at substantially 90° to the plane of the plate out of one end of the plate.
- The plate may comprise a seat which supports at least one of the purlins or joists. Thus the purlin or joist may be placed on the seat which may comprise a flange turned out of one side of the plate.
- 60 The plate may be adapted for combining with a similar plate to provide a sleeve which embraces the respective adjacent ends of the purlins or joists in use.

The plates may be integral and parallel and may be connected by the seat which extends between both plates.

The plates may be formed from a single blank of metal which when folded provides a first plate, a seat, a second plate substantially parallel to the first plate, the seat connecting the two plates, and a stop at one end of the seat and at one end of the connector and stop means at the opposite end of the connector.

The stop means may comprise two stops bent inwardly of each plate.

The two stops may be at the same vertical height in use of the connector.

Each plate may have an inwardly directed flange substantially parallel to the seat and including means for securing to the upper surfaces of the two purlins or joists in use.

The flanges may extend over the length of the respective plates and may each extend substantially to the centre of the connector.

Alternatively, the flanges may extend over part of the length of the respective plates, one flange being offset from the other longitudinally of the connector so that each extends substantially over the width of the connector without overlapping the other.

Connectors embodying the invention are diagrammatically illustrated, by way of example, with reference to the accompanying drawings.

90 Figs. 1, 1 and 3 are respective side elevational, end and plan views of one connector according to the invention;

Fig. 4 is to an enlarged scale a perspective view of the top of the connector of Figs. 1, 2 and 3;

Fig. 5 is a schematic view of the connector of Figs. 1, 2, 3 and 4 in use to connect together adjacent ends of two purlins or joists;

Fig. 6 is a plan view of a blank from which the connector of Figs 1-6 is made;

Fig. 7 is a view similar to Fig. 4 showing the top of a second embodiment of connector;

Fig. 8 is a plan view of a blank for making a third connector according to the invention;

Fig. 9 is an end elevational view of the connector of Fig. 7 and to a smaller scale than that Fig; and

Fig. 10 is a perspective view of the connector of Fig. 8 in use to connect cantilevered purlins or joists.

Referring firstly to Figs. 1-6, the connector 1 shown is for connecting adjacent ends of two purlins or joists 2 and 3 (Fig. 5), the connector 1 being formed from a single blank 4 of sheet metal such as mild steel. The connector 1 comprises two plates 5 and 6, a first one 5 being substantially parallel to the second plate 6 and including means in the form of holes 7 for securing the connector to the purlins or joists 2 and 3 and means in the form of stops 8, 9 and 10 to limit the respective position of the purlins or joists 2 and 3.

The plates 5 and 6 are connected by a lower, in use and as viewed, flange or seat 11 which is integral with them. Each plate 5 and 6 has at its upper end as viewed a bent over flange 12 extending over the length of the plate and meeting substantially at the longitudinal centre line of the connector 1, the flanges having holes

12a.

The lower stop 8 is substantially centrally of the seat 11 and comprises a lug bent upwardly as viewed at substantially 90° thereto. The stops 9 and 10 comprise stop means in the form of lugs bent from the respective plates 12 at substantially the same vertical position over the height of the connector.

The holes 7 in one plate 5 are staggered or offset with respect to the holes 7 in the other 6 plate so that when nails are passed through the holes 7 and are hammered into the purlins or joists, from opposite sides, the nails do not touch.

In use the connector 1 is offered up to and slipped over the free end of one joist 2 so that the end face of the joist abuts the inner (to the right as viewed in Fig 1 and to the left as viewed in Fig. 5) face of the stop 8 and so that it abuts the outer (to the right as viewed in Fig. 1 and to the left as viewed in Fig. 5) face of the stops 9 and 10. The stops 8, 9 and 10 limit the position of the purlin or joist. The second joist 3 is then slipped into the connector 1, the second joist abutting the outer surface of the stop 8 and the inner surface of the stops 9 and 10 and is again limited in position longitudinally by the stops 8, 9 and 10. The ends of the joists thus essentially meet along the line "Y" (Fig. 5) which is the central line of the connector about which it is symmetrical.

Nails are hammered into the joists 2 and 3 through the holes 7.

The separation of the plates 5 and 6 via the gap between the flanges 12 provides a certain flexibility when connecting the connector 1 and joists 2 and 3 and enables the plates 5 and 6 to be moved or flexed transversely to the vertical plane in which they normally lie.

As shown in Fig. 5 substantially half of one plate 5 is secured to one joist 2 and half to the other 3.

The connector 1 is formed from a blank 4 of metal (Fig. 6) which has two wings 13 and 14 and a centre portion 15. A projection 16 forms the stop 8 and projections 17 and 18 form the stops 9 and 10. For each projection on one side of the blank there is a corresponding recess 19, 19a, 19b on the opposite side. This is because identical blanks 4 shown can be stamped, cut or otherwise formed in an automatic process from a continuous strip of metal, the blank 4 shown being complementary to an "nesting" with the blanks 4a and 4b (schematically shown) immediately preceding and succeeding it. Thus as the strip of metal is indexed through a forming tool, each blank 4 is cut, the recesses 19a and 19b providing the metal for the lugs 17 and 18 of the immediately succeeding blank to be formed and the recess 19 being where the lug 16 of the immediately preceding blank was formed. This is shown schematically in dashed lines in Fig. 6. This process provides for virtually no wastage of material.

The holes 7 are formed with the cutting out of the blank, and are offset in each wing 13 and 14, so that the holes are not aligned in the two plates as previously described.

Each wing 13 and 14 is then folded about respective lines R and S to provide the plates 5 and 6 and the projections 16, 17 and 18 are folded about lines X to provide the stops 8, 9 and 10.

The second connector 100 shown in Fig. 7 is similar

to the first and is made from a single blank of material in a similar way. However, the upper flanges comprise a flange 101 which extends over about half the length of the plate 5 and extends over the width of the connector from the plate 5 and a flange 102 which similarly extends from the plate 6. One flange 101 is longitudinally offset with respect to the other 102 so that they do not overlap in the longitudinal sense but abut each other along a line 103 which is a transverse centre line of the connector. This embodiment provides more metal in which to locate holes 104, so providing a secure fixing means.

Referring now to Figs 8, 9 and 10 of the drawings, there is shown in Figs. 9 and 10 a connector 201 for connecting adjacent butt jointed ends of two timber purlins or joists 202 and 203, the connector 201 being made from a single blank 204 of metal such as hot dipped galvanised sheet steel to BS 2989, 1955, Z2 quality, coating type "C", (Fig. 8).

The blank 204 shown in Fig. 8 is formed from a strip of metal for example by stamping in a continuous operation for forming a plurality of identical blanks from the single strip, each blank 204 like the one shown being nested with the immediately preceding and succeeding blank.

Thus the edge 205 of the one blank is formed when the opposite edge 206 of the immediately preceding blank is formed. The width of the blank from edge 207 to edge 208 is the width of the strip. (A wider blank formed from wider strip is shown in dash lines 207', 208'). Thus there is no wastage of material and the blanks 204 can be stamped out in a continuous forming operation.

The blank 204 has cut out of it three spaced U-shaped cut outs 209, 210 and 211 into each of which a tab 212 projects, each tab 212 being joined to the remainder of the blank 204 along a respective fold or bend line 213, the fold lines 213 being aligned, or lining on a single plane. There are a series of fold lines 214, 215, 216, 217 and 218 and 214', 215', 216', 217', 218' at opposite sides of the central portion 219 of the blank 204 containing the central cut-out 209 and tab 212. The lateral parts or wings 220, 221 are folded about a respective pair of lines 214, 214' say to provide a central plate 219 of the required width to accept particular joists widths for example 38mm, 44mm, 50mm, 63mm and 75mm. The spacing of the particular lines is just greater, in the embodiment shown by 3mm, than the width of the joist. For example lines 218, 218' are spaced by 41mm to accommodate 38mm thick joists. The extra width of metal is to provide a smooth bend. There is also a through hole 222, and means for securing the connector in the form of holes 223 and 223' for securing means such as nails.

The blank 204 is folded up about a part of line 214 etc, 214' etc so that the lateral parts or wings 220 and 221 are substantially parallel and form respective plates of the connector 201, the central part 219 forming a seat or web, connecting the plates 220 and 221. The connector 201 is thus of channel or U-shape. The tabs 212 are bent about the respective lines 213 so that they are respectively substantially at 90° to their respective plate 220 or 221 or web 219 and in the same plane, the tabs 212 forming stop means or lugs which are directed to the interior of the channel (Figs. 9, 10).

The connector 201 formed from the blank is used for connecting adjacent ends of the two purlins or joists 202 and 203 extending in substantially the same plane, the ends being butt jointed. In use, the free end of the cantilevered purlin or joist 202 is inserted between the plates 220 and 221 so that it butts up against the inner (to the left as viewed in Fig. 10), surfaces of the stop means formed by tabs 212. Securing means such as nails are then hammered through the holes 223 into the joist 202 to secure it and the connector together. The part of each plate and web to the right of the tabs 212 (as viewed in Fig. 10) then projects beyond the free end of the joist. The end of the joist 203 to be butt jointed with the free end of the joist 202 is then inserted into the connector 201, between the plates 220 and 221 and seating on the web 219 and butted up against the stop means 212. Securing means such as nails are then inserted in the holes 223 and hammered into the joist 203. The joists 202 and 203 are then connected together. The right hand end (not shown) of the joist 202 rests on a wall or beam (also not shown) parallel to the wall supporting the joist. The lugs 212, by butting against the adjacent ends, automatically align the connector 201 in the correct position relative to the end of the first joist ready to receive the joist to be aligned with the second joist and connected by the connector 201. The connector provides for self-location of two joists connected axially, very accurately.

The holes 223 and 223' in the plate 220 are staggered or offset from the equivalent holes in the plate 221 so that nails through holes 223 and 223' in the plate 220 do not interfere with nails through the holes 223 and 223' in the plate 221.

It will be understood that the connector 201 may be mounted on the joist 203 before connecting that joist 203 with the joist 202.

Although holes 7, 223 and nails have been described as means of securing the connector to the joists, they could be replaced by equivalent means such as tangs or teeth (not shown) struck out of the plates.

#### CLAIMS

1. A connector for connecting adjacent ends of two purlins or joists extending substantially in the same plane, comprising a plate adapted to extend between respective adjacent outer surfaces of both purlins or joists and including means for securing the plate to those outer surfaces and means to limit the respective positions of the purlins and joists.
2. A connector according to Claim 1, comprising two plates connected by a web to provide a substantially U-shaped sleeve, each plate and the web comprising respective means to limit the position of adjacent ends of aligned purlins or joists.
3. A connector according to Claim 2, the plates being formed from a single blank of metal which when folded provides a first plate, a web or seat, a second plate substantially parallel to the first plate, the web or seat connecting the two plates, and aligned means of each plate and of the web or seat to limit the position of adjacent ends of two purlins or joists connected by the connector in use thereof.
4. A connector according to any preceding claim, the means to limit the position comprising a stop provided at one extremity of the plate or plates.

5. A connector according to Claim 4, the stop being integral with the or each plate and turned at substantially 90° to the plane of the plate out of one end of the plate.

6. A connector according to Claim 5, there being two stops at substantially the same vertical height of the connector in use.

7. A connector according to any of Claim 2 to 6, each plate comprising an inwardly directed flange substantially parallel to the seat and including means for securing to the upper surfaces of the two purlins or joists in use.

8. A connector according to Claim 7, the flanges extending over the length of the respective plates and each extending substantially to the centre of the connector.

9. A connector according to Claim 7, the flanges extending over part of the length of the respective plates, one flange being offset from the other longitudinally of the connector so that each flange extends substantially over the width of the connector without overlapping the other.

10. A connector according to any preceding claim, the means for securing comprising through holes through the or each plate.

11. A connector according to any one of Claims 1 to 3, the means to limit the position of the purlins or joists comprising stop means intermediate the length of the plates and/or the web.

12. A connector for connecting adjacent ends of two purlins or joists extending substantially in the same plane, substantially as hereinbefore described with reference to Figs. 1 to 6, 7, or 8 to 10 of the accompanying drawings.

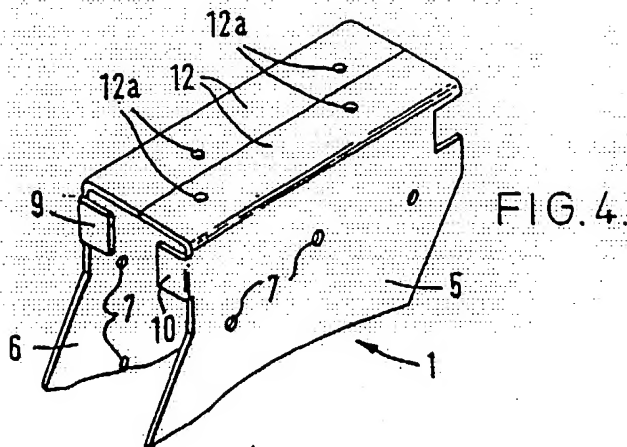
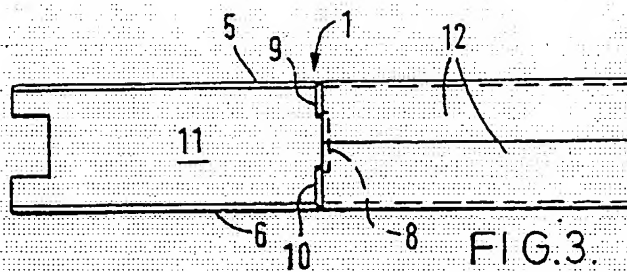
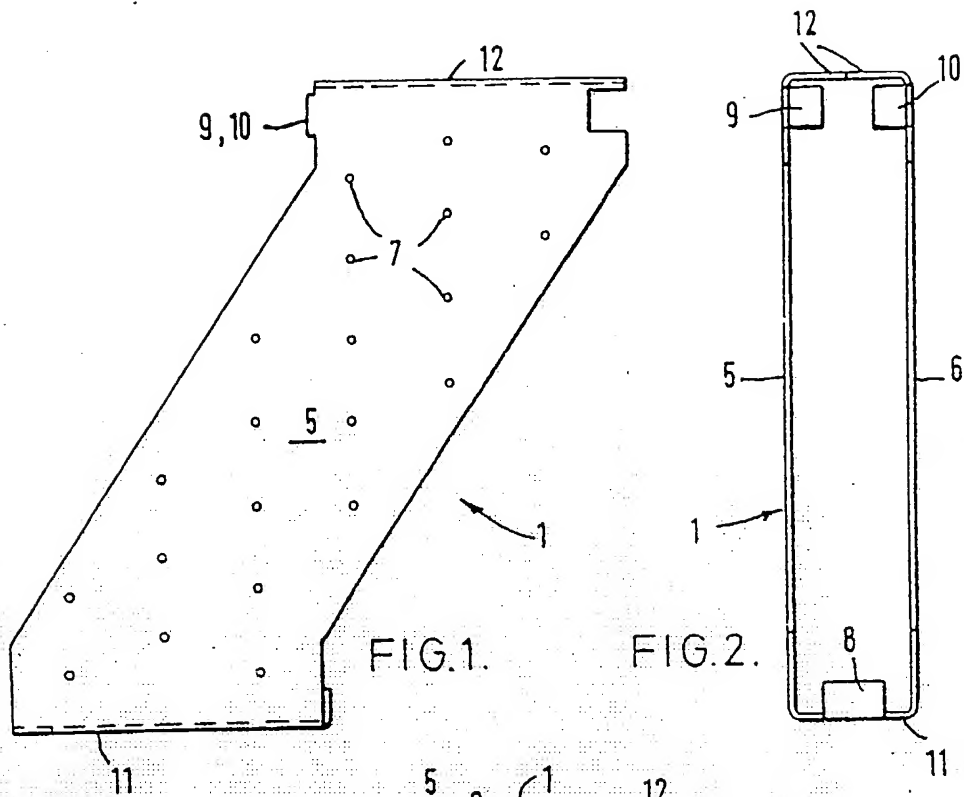
13. A method of making a connector according to any preceding claim, from a blank according to Claim 2, comprising turning opposite spaced edge portions of the blank in the same direction out of the plane of the blank to provide substantially parallel plates and a web connecting same.

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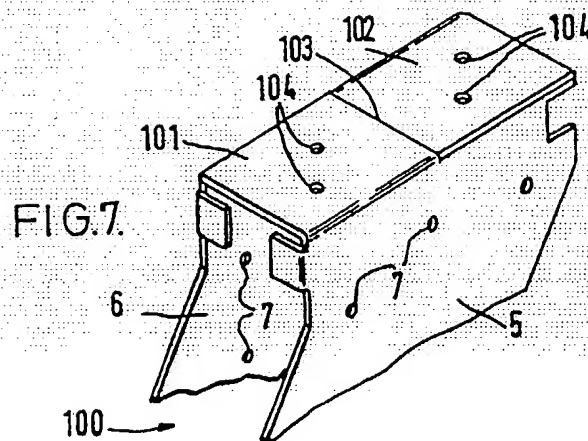
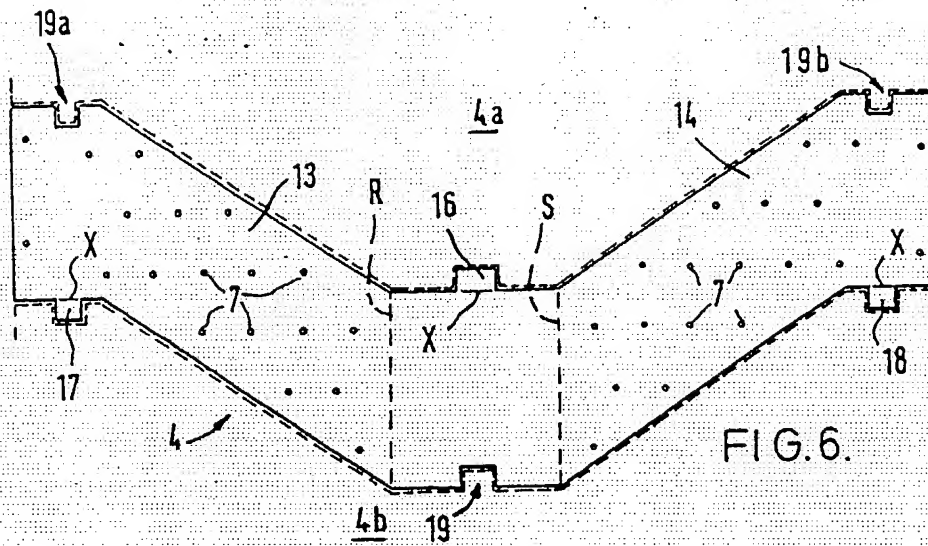
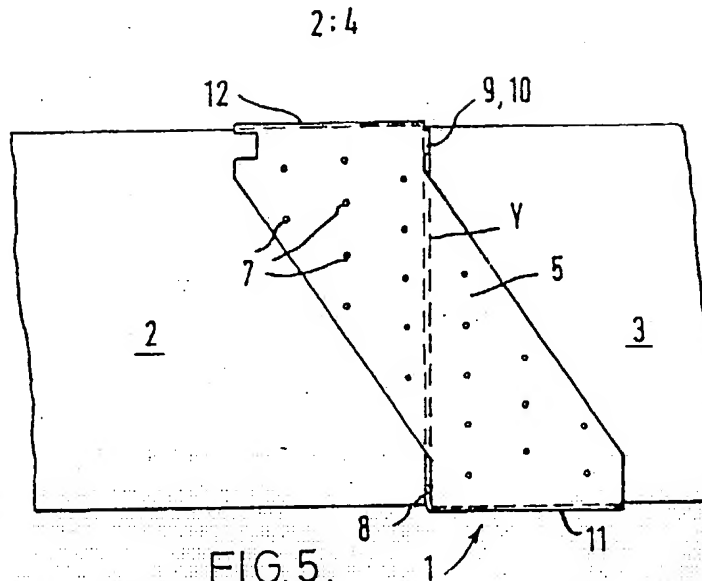
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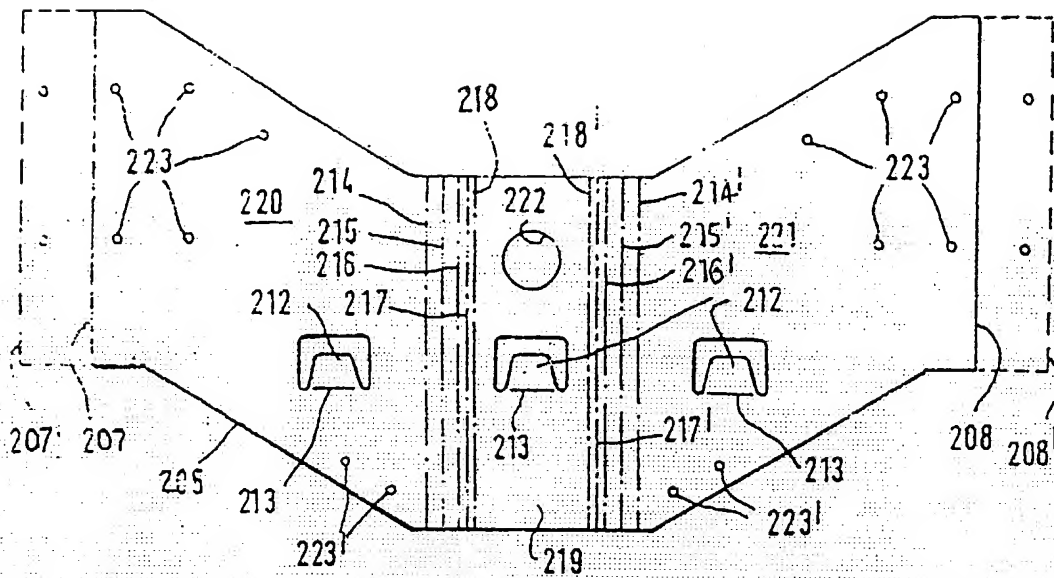


FIG. 8.

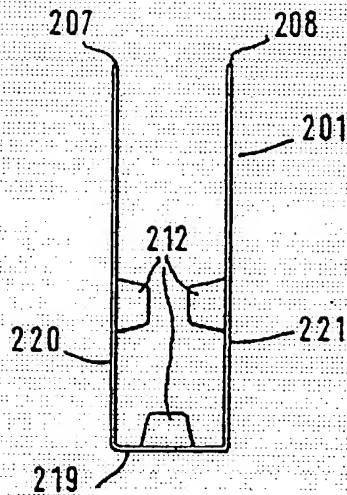


FIG. 9.



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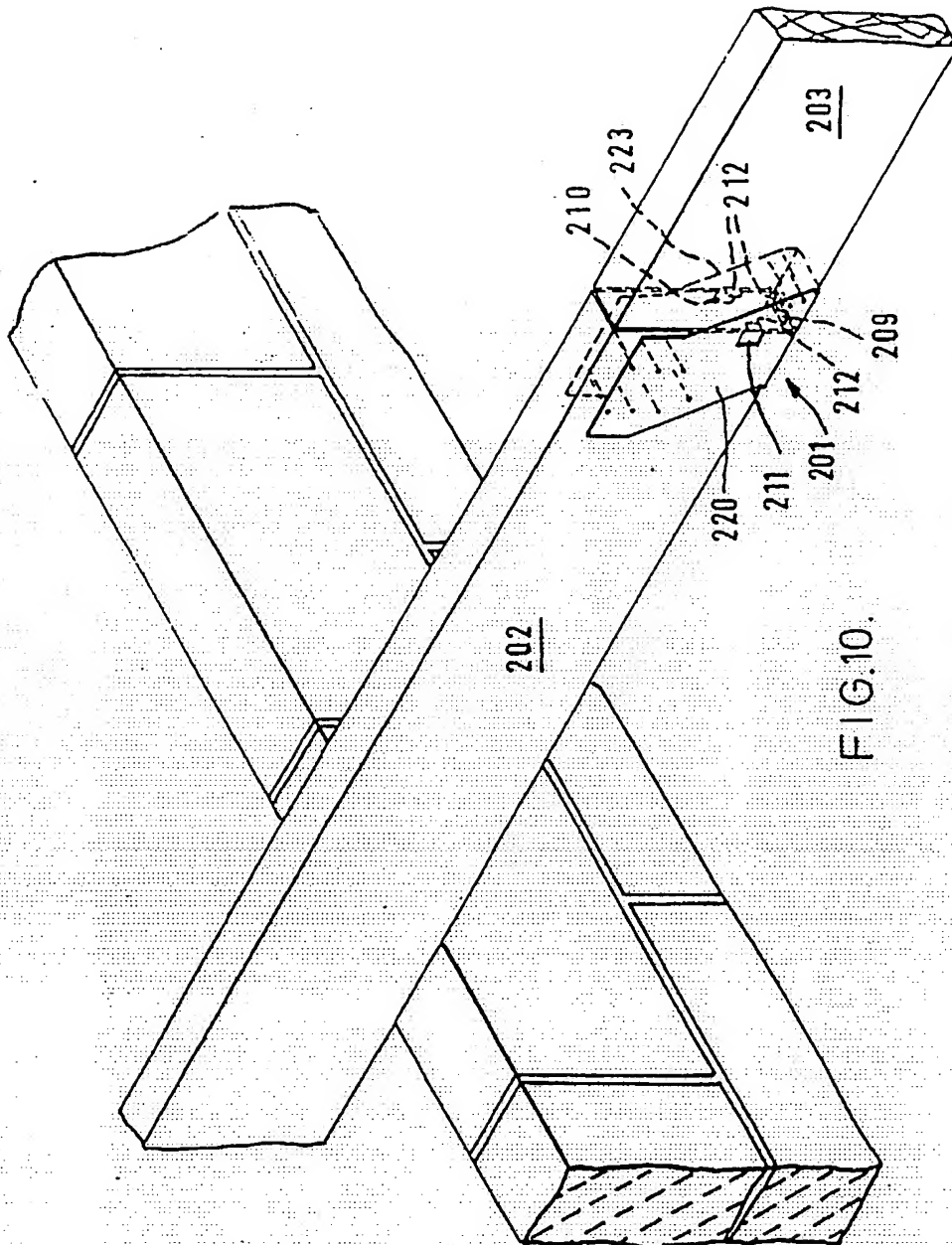


FIG.10.